

Application No. 10/518,410
Amendment dated September 19, 2008
Reply to Office Action of May 19, 2008

Docket No.: 1254-0266PUS1

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to Fig. 3(c).

Attachment: Replacement sheet

REMARKS

Claims 2-4, 7-10, and 13-19 are present in this application. Claims 2, 3, 7, 15, and 16 are independent claims. Claim 4 has been canceled.

Statement of Interview

The Applicant thanks the Examiner for conducting an interview on August 8, 2008. During the interview, during which differences over the Jacobsen reference were discussed. Applicant provides herein remarks that further explain differences over the cited prior art.

Drawings

Fig. 3 has been objected to due to inconsistencies with the specification. Applicant provides a corrected drawing for Fig. 3(c), in which the "CLOSE" and "OPEN" are replaced by "OPEN" and "CLOSE," respectively. Applicant requests that the objection to the drawings be reconsidered and withdrawn.

§ 112, First Paragraph, Rejection

Claims 2-4, 7-10, and 13-19 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Applicant respectfully traverses this rejection.

On page 3 of the Office Action, the Examiner states that: "The claimed operation of inverting the direction of the horizontal scan along a row (as opposed to inverting the horizontal direction scan signal) is actually performed by the signal driving circuit as explained on page 15, lines 12-15 of the specification."

Applicant notes that the explanation on page 15 pertains to a second disclosed embodiment of the present invention (described beginning at page 12 with respect to Figs. 4, 5),

which does not include a scan inverting circuit. The claimed “scan inverting circuit” pertains to the first disclosed embodiment.

With respect to the first disclosed embodiment, the specification at page 10 describes “horizontal direction scan inverted signal hsi” as affecting the scan direction from “right to left” in a previous frame period to “left to right” in the present frame period (specification at page 10, paragraph beginning at line 15).

Applicant submits that that the specification does enable one of ordinary skill in the art how to make and use the invention. Applicant requests that the rejection be reconsidered and withdrawn.

§ 103(a) Rejection – Fukumoto, Guha, Harris, Jacobsen, Liang

Claims 2, 7-10, and 13-19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 07-244,267 (Fukumoto) in view of U.S. Patent 5,739,545 (Guha; newly cited), U.S. Patent 5,115,228 (Harris), U.S. Patent 6,232,937 (Jacobson; newly cited), and U.S. Publication 2003/0035198 (Liang). Applicant respectfully traverses this rejection.

Summary of the Present Invention

A first example embodiment of the present invention is a matrix arrangement of two-sided display elements, such as the two-sided display element shown in Fig. 1. The matrix arrangement of two-sided display elements making up a display panel (described at page 8, lines 4-7; DP in Fig. 2) is capable of performing horizontal scan in two directions in order to display mirror images on both sides of the two-sided display. Each display element emits light upon receiving a video signal from the signal driving circuit and a horizontal direction scan signal from the scan driving circuit (original specification at page 9, second full paragraph).

In the first embodiment, the horizontal direction scan signal is modified by a scan inverting circuit to also indicate the direction of horizontal scan. The modified signal is referred to as a horizontal direction scan inverted signal hsi. In particular, the horizontal direction scan

inverted signal is a conventional horizontal scan signal generated by the scan driving circuit, but modified to indicate the direction of horizontal scan (e.g., regular left-to-right, or reverse right-to-left). The display panel performs horizontal scan in the direction indicated by the horizontal direction scan inverted signal hsi. As an example, when the horizontal direction scan inverted signal is high, horizontal scan direction on the display panel is initiated in a direction left-to-right. When the horizontal direction scan inverted signal is low, horizontal scan direction on the display panel is initiated in a direction right-to-left. (specification at page 10, lines 15-18). Otherwise, horizontal scanning still occurs in a normal fashion in either direction. In other words, a low horizontal direction scan inverted signal does not mean that there is no horizontal scan performed during that period.

In the first embodiment (e.g. Fig. 2), the orientation of the displayed image is reversed synchronous with the change in scan direction. With reference to Fig. 2, the specification discloses,

“In Fig. 2, an image signal outputted per frame from the image signal source SG is fed to the frame memory circuit 11. The image signal source SG also supplies the frame signal to the scan driving circuit 13. The scan driving circuit 13 generates a horizontal direction scan signal hs regarding the display panel DP in synchronism with the frame signal from the image signal source SG. The horizontal direction scan signal hs from the scan driving circuit 13 is fed to the scan inverting circuit 15, where the scan direction is inverted per frame, thereby generating a horizontal direction scan inverted signal hsi with which the display panel DP is driven.”

Further with respect to the scan inverting circuit 15, the specification discloses that,

“as the horizontal direction scan inverted signal hsi is supplied from the scan inverting circuit 15 to a scan line extending in the row direction on the display panel DP, a video signal and the horizontal direction scan inverted signal hsi are applied to each display element DE on the display panel DP, thereby causing the display element DE disposed at a location where the activated signal and scan lines intersect to emit light. This enables a display on the display panel DP in accordance with the signal from the image signal source SG.”

“The horizontal scan inverted signal hsi from the scan inverting circuit 15 is further inverted in the inverter 16 back to the same signal as the original

horizontal direction scan signal hs , which is then provided to the shutter switching circuit 14.”

This feature of the display control means including scan inverting circuit is covered in claim 2 as,

“said display control means comprises a scan inverting circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field, which display a first display from the first side of the display panel and a second display from the second side of the display panel;”

“said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from said scan inverting circuit.”

Differences over Fukumoto, Guha, Harris, Jacobsen, Liang

Embodiments of the present invention covered by claim 2 are directed to a display apparatus comprising a “display panel” including a plurality of “imaging devices,” a “liquid crystal shutter means” and associated “liquid crystal shutter control means,” and a “display control means” including “scan inverting circuit.”

With regard to the above-stated features for the display control means comprising a scan inverting circuit, the Examiner admits that

“Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means comprising a scan inverting circuit. However, as defined in Figures 2 and 3 of the Application disclosure and pages 9 and 10 of the specification, the scan inverting circuit merely inverts the horizontal scan signal (Page 9, lines 6-12).

Applicant submits that the later statement is in error. With regard to the function of the scan inverting circuit, the specification states that “the scan direction is inverted per frame.” The specification further discloses that “a horizontal direction scan inverted signal hsi outputted from

the scan inverting circuit 15 is high, and so the horizontal direction scan on the display panel DP is initiated in a direction opposite to the scan direction in the previous frame period P1.” (specification at page 10, lines 15-18).

Further regarding the claimed display control means comprising a scan inverting circuit, the Examiner goes on to state “The Examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.” (Office Action at page 8)

Official Notice

Despite the five cited references, the Examiner takes Official Notice that “” (Office Action at page 8).

Pursuant to MPEP §2144.03, Applicant requests documentary evidence to support the Examiner’s assertion that “inverters in signal paths of display drivers are well known in the art”, on the basis that Applicant submits that it would not be obvious to one of ordinary skill in the art to include a scan inverting circuit for inverting the direction of horizontal scan along a row on a display panel in each frame or each field, which display a first display from the first side of the display panel and a second display from the second side of the display panel, in the context of the claim as a whole.

Based on the taking of Official Notice, the Examiner concludes:

“Since Fukumoto et al. as modified by Guha et al. and Harris et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:

said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from said scan inverting circuit.

Applicants submit that there is no basis for this conclusion at least because none of the cited prior art disclose a two-sided display panel having a normal scan direction and a reverse scan direction, and an associated control circuit.

The Office Action alleges that Harris discloses “display control means” (20, 26, 28, 34) for displaying a first image in every frame or every field which can be seen from the one side of the display panel and a second image which can be seen from the other side of the display panel in every other frame or every other field, and “liquid crystal shutter control means” for opening and closing said pair of liquid crystal shutter means in synchronism with the operation of said display control means in each frame scan or each field scan such that they do not open simultaneously, wherein said pair of liquid crystal shutter means are opened and closed by said liquid crystal shutter control means such that said first and second image can be observed as the original display on each side of said display panel (Col. 3, line 46 – Col. 4, line 4).

Harris discloses two gate signal generators 42 and 44, producing a gate signal 30 and a gate signal 32, respectively. Harris further discloses that,

“gate signal 30 drives shutter driver 22 and simultaneously drives buffer 28. Similarly, gate signal 32 drives shutter driver 24 and simultaneously buffer 26. Display 10 displays the data from either buffer 26 or 28 through OR gate 20. Data generator 46 provides data for both buffers 26 and 28...Data generator 46 coordinates sending data to buffers 26 or 28 with the generation of gate signals 30 and 32.” (col. 3, lines 47-56).”

Thus, it can be seen that Harris discloses coordination of sending data to buffers 26 or 28 with the generation of gate signals 30 and 32 rather than a display driven by a horizontal scan. Subsequently, Applicant submits that Harris does not at least teach a horizontal scan of which a display control means would invert the direction of. Applicant submits that the other cited references fail to make up for the above-stated deficiencies in Harris.

For at least these reasons, Applicant submits that Fukumoto, Guha, Harris, Jacobsen, and Liang, either alone or in combination, fail to teach or suggest at least the claimed

“said display control means comprises a scan inverting circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field, which display a first display from the first side of the display panel and a second display from the second side of the display panel; and

said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from said scan inverting circuit.”

These arguments apply as well to claims 7, 15, 16, and respective dependent claims.

Therefore, Applicant submits that the rejection fails to establish *prima facie* obviousness and must be withdrawn.

§ 103 Rejection – Fukumoto, Guha, Kanemori, Harris, Jacobsen, Liang

Claims 3 and 4 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukumoto, Guha, U.S. Patent 5,164,851 (Kanemori), Harris, Jacobson, and Liang.

Claim 3 has been amended to explicitly cover the second embodiment of the present invention (e.g., Figs. 5-7). Claim 4 has been canceled. Applicant respectfully traverses this rejection.

In the second embodiment, the picture elements (e.g., P1, P2) consist of pairs of display elements (e.g., DE1, DE2; DE3, DE4), each connected to respective signal driving wires (e.g., 20, 21).

According to the present specification at pages 17-18,

“for each picture element of the entire rows, the opening and closing of the liquid crystal shutters sandwiching the display elements are controlled such that, in each frame scan period, the liquid crystal shutters disposed on one side of all the display elements connected to the first signal driving wires are controlled to

be in a first state (the open state, for example), and the liquid crystal shutters disposed on the other side are controlled to be in a second state (the closed state, for example), while the liquid crystal shutters disposed on one side of all the display elements connected to the second signal driving wires are controlled to be in the second state, and the liquid crystal shutters disposed on the other side are controlled to be in the first state.”

“Consequently, as the liquid crystal shutter disposed on one side of each display element connected to the first signal driving wire and the liquid crystal shutter disposed on the other side of each display element connected to the second signal driving wire are driven to be in a light-transmitting state simultaneously, the same screen can be viewed from either side of the display panel DP by providing a signal for displaying the image data to the first and second signal driving wires in the order already described in Fig. 7 in each horizontal scan period.”

This feature is recited in claim 3 as amended, as

“liquid crystal shutter control means for controlling said liquid crystal shutter means such that first liquid crystal shutters on one side of said display panel for at least one first display element of each said picture element and second liquid crystal shutters on the other side of said display panel for at least one second display element, different from said first element, of each picture element are simultaneously open to be put in a transmitting state, in order that a regular image can be observed simultaneously from both surfaces of said display panel.”

In other words, in the second embodiment, because each display element includes a pair of liquid crystal shutters disposed on either side of the display element, liquid crystal shutters on each side of the display panel are driven to be in a light-transmitting state simultaneously.

Applicants submit that none of the cited references teach at least this feature of the present invention.

Applicants request that the rejection of claim 3 be reconsidered and withdrawn, based on the claim as amended.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact **Robert Downs** Reg. No. 48,222 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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